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IN THE US PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Yomeyama

Group Art Unit: 2612

Application No: 09/293,490

Filed: April 15, 1999

For: Electronic Camera and Solid-State Camera Element that Provides a Reduced Pixel Set

Examiner: Hannett, James M.

Attorney Docket No. 1113-011/MMM

APPELLANT'S BRIEF (37 CFR 41.37)

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This brief is in furtherance of the Notice of Appeal filed July 26, 2004, in connection with the captioned application. The $500 fee required under 37 CFR 1.17(c) is enclosed herewith. An extension of time for 2 months to December 26, 2004 is requested.

12/27/2004 YPOLITE1 00000116 09293490
01 FC:1402 500.00 OP

12/27/2004 YPOLITE1 00000116 09293490
02 FC:1252 450.00 OP

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Mark M. Meininger

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1. Real Party in Interest

The real party in interest is Nikon Corporation, Tokyo Japan.

2. Related Appeals and Interferences

There are no related appeals or interferences.

3. Status of Claims

Claims 1, 2, and 4-14 are on appeal and pending in the application.

4. Status of Amendments

An amendment was filed after the February 2, 2004 final rejection and has been entered.

5. Summary of Claimed Subject Matter

a. Background of the Invention and Summary of the Prior Art

Electronic cameras focus light through a lens onto a solid-state camera device having light receiving picture elements, or pixels. In charge coupled devices (CCDs), these pixels include photodiodes that provide an electrical signal indicative of light incident on the pixel, and other solid-state circuitry to read (that is, transfer) the electrical signal to a display or memory. The pixels are arranged in a matrix of rows and columns. The greater the number and density of pixels in the matrix, the greater the photographic resolution. Thus, it is desirable to have a high number of pixels packed densely in the pixel matrix.

A characteristic of electronic cameras is that photographic images can be confirmed by immediate playback, and photographic conditions, such as composition and exposure, can be determined on an attached display (such as an LCD) before images are recorded. However, the number of pixels in the camera device and the display element differ, due to factors such as differences in technical progress between the two types of elements. Also, in high quality camera devices having many pixels, it is not feasible to use a display element with the same number of pixels because of the high cost of such a display.

In prior art electronic cameras, all camera device pixels are read, providing image data. This image data is temporarily stored in an image memory. Thereafter, only image data corresponding to the number of pixels required for the display element are read from the image memory. Thus, when the number of pixels of the camera device is greater than the number of pixels of the display device, image data are reduced by selective transfer of image data from the image memory. Full image data (all pixels) are used for recording the photographic image.

This prior art operation, of reading all pixels from a solid-state camera device and storing the image data from all pixels in image memory, and scanning only the required portion of image memory for display has the problems of taking a long time to execute and consuming much power. In addition, in the case of color picture elements, when image data are systematically selected from image memory, the resulting image may not include all the color signals required for proper color display.

b. Concise Summary of the Present Invention

The present invention provides a solid-state camera device that can read selected pixels of the pixel matrix directly from the solid-state camera device to create a reduced pixel set having reduced image data for purposes of image display, or to set photographic conditions. Reading the reduced pixel set directly from the solid-state camera device can be performed at higher speed and reduced power consumption than prior art devices that read the entire pixel matrix from the solid-state camera device. When it is desired to record the photographic image, the entire pixel matrix may be read for greatest resolution.

The present invention also provides a method to obtain the reduced pixel set having image data that is proportionately comparable to the image data of the entire pixel matrix, including a reduced pixel set having color signal data that is proportionately comparable to the color signal data when all pixels are read. The present invention also includes an electronic camera using the solid-state cameral device.

A first preferred embodiment includes a solid-state camera device having a plurality of photoelectric conversion pixels arranged in a matrix along rows and columns. A vertical scanning circuit selects a row of the photoelectric conversion pixels, and a

horizontal scanning circuit that selects a column of the photoelectric conversion pixels. The vertical scanning circuit and the horizontal scanning circuit control the reading of pixel signals and the transfer of image data from the camera device. The vertical scanning circuit and the horizontal scanning circuit include group scanning circuits that sequentially select row groups with several rows of pixels and column groups with several columns of pixels, respectively. Row and column selector circuits output image signals according to selection signals by selecting desired rows and columns from within the row group and column group.

Therefore, it is possible to accurately read only pixels in the desired rows and columns. This process is referred to as "thinning" wherein a reduced pixel set is thinned from the full pixel matrix. Further, pixels can be thinned according to a selection signal supplied to the selector circuit so that the thinned pixel set can be proportionately comparable to the full pixel set, by uniformly selecting pixel rows and columns.

The present invention permits substantial control over the sequence of reading pixels directly from the solid-state camera device to provide the reduced pixel set. In providing the reduced pixel set, it is desirable to uniformly thin the pixels so that a uniform number of pixels is read from each row and column. Alternatively, in a color pixel matrix, it is desirable to thin such that the resulting reduced pixel set mimics a sequence of pixel colors of the full pixel set.

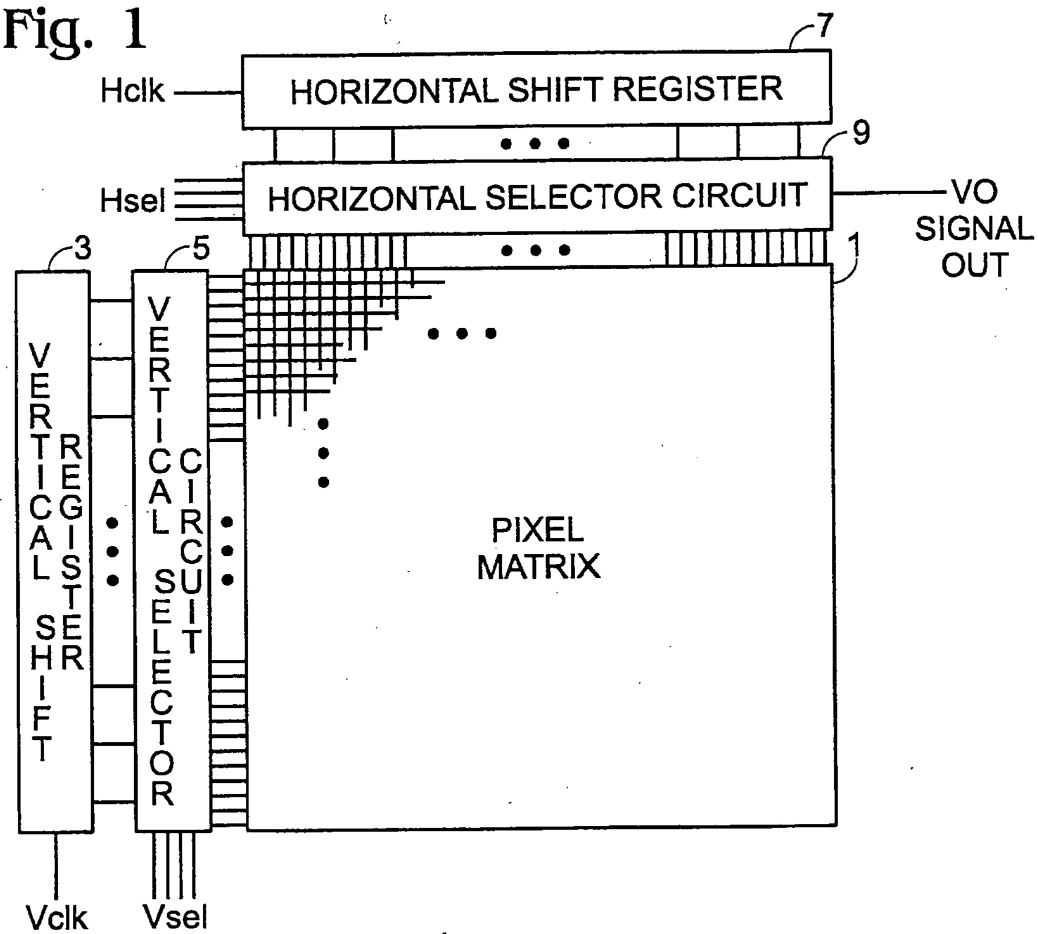
An electronic camera of the present invention includes a camera lens that receives image light from a photographic object, the solid-state camera device having photoelectric conversion pixels arranged in a matrix of rows and columns, the scanning circuit that reads pixels by selecting the pixels sequentially and can read by systematically thinning some pixels, and a controller that scans the solid-state camera device sequentially without thinning when obtaining image signals for photographing or recording, and scans the solid-state camera device by thinning when obtaining image signals for display.

c. Concise Explanation of the Subject Matter of Independent Claim 1

Referring to Fig. 1 (reproduced below), claim 1 recites a solid-state camera device has a pixel matrix 1 with a plurality of photoelectric pixels arranged in a plurality of rows

and columns. A vertical scanning circuit (3,5) selects a row of the plurality of rows of photoelectric pixels. A horizontal scanning circuit (7,9) selects a column of the plurality of columns of photoelectric pixels. An image signal is read by selecting at least one photoelectric pixel by the vertical scanning circuit (3,5) and horizontal scanning circuit (7,9) and transferring a charge from the at least one selected photoelectric pixel (App. page 5, lines 1-6.)

Fig. 1



The camera device includes a vertical group scanning circuit (3) and a vertical selector circuit (5) that are included in the vertical scanning circuit. The vertical group scanning circuit (3) selecting successive row groups that each includes a plurality of rows. The vertical selector circuit (5) selects at least one desired row within each successive row group selected by the vertical group scanning circuit to provide a row pixel set. The successive row groups extend substantially completely across the pixel

matrix (1) in a vertical direction. (App. page 10, line 23 to page 13, line 9, including Tables 1-3.)

The camera device includes a horizontal group scanning circuit (7) and a horizontal selector circuit (9) that are included in the horizontal scanning circuit. The horizontal group scanning circuit (7) selects successive column groups that each includes a plurality of columns. The horizontal selector circuit (9) selects at least one desired column within each successive column group selected by the horizontal group scanning circuit to provide a column pixel set. The successive column groups extend substantially completely across the pixel matrix (1) in a horizontal direction. (App. page 10, line 23 to page 13, line 9, including Tables 1-3.)

d. Concise Explanation of the Subject Matter of Independent Claim 10

Referring to Fig. 1 (reproduced above), claim 10 recites a solid-state camera device having a plurality of photoelectric pixels arranged in a matrix (1) along rows and columns. A reading scanning circuit (3,5,7,9, full scan mode) selects and reads photoelectric pixels.

Claim 10 includes a means plus function element referred to as "means for reading a reduced pixel set," the pixel set comprising plural spaced-apart horizontal rows of pixels and plural spaced-apart vertical columns of pixels. The means for reading a reduced pixel set corresponds to selector circuits (3,5,7,9, partial scan mode), as described with reference to the section "simple ½ thinning," which begins at application page 10, line 22:

> To read horizontal columns, horizontal shift register 7 and horizontal selector circuit 9 are enabled to read column 1 of the first column block, as described above. Next, keeping horizontal shift register 7at the same setting without advancing, horizontal selector circuit 9 selects pixel (1,3) in column 3, which is then read. Next, horizontal shift register 7 is advanced one stage to the next column group (columns 5, 6, 7, and 8) and the horizontal selector circuit selects the first column of the second column block--that is, matrix column 5, which is then read. Thereafter, the third column of the second column block—that is, matrix column 7--is read. Thus, far, the following pixels are have been read: (1,1), (1,3), (1,5), and (1,7). Similarly, (1,9); (1,11), (1,13), (1,15),... are read in the same way until all selected pixels of the row are read.

Claim 10 further recites that the horizontal rows are arranged substantially completely across the matrix in a vertical direction, and the vertical columns are arranged substantially completely across the matrix in a horizontal direction. (App. page 10, line 23 to page 13, line 9, including Tables 1-3.)

e. Concise Explanation of the Subject Matter of Independent Claim 11

Claim 11 recites a solid-state camera device (Fig. 1) having a color pixel matrix (Fig. 4, reproduced below) including a plurality of photoelectric pixels of different colors arranged in a first sequence of colors along rows and columns.

Fig. 4

GRGBGRGBGRGBGRGB
GBGRGBGRGBGRGBGR
GRGBGRGBGRGBGRGB
GBGRGBGRGBGRGBGR
GRGBGRGBGRGBGRGB
GBGRGBGRGBGRGBGR
GRGBGRGBGRGBGRGB
GBGRGBGRGBGRGBGR

A reading scanning circuit (3,5,7,9) reads pixels by selecting a reduced pixel set of the photoelectric pixels in the color pixel matrix. The reduced pixel set includes at least omitted rows of pixels or omitted columns of pixels and having a color sequence that is substantially similar to the first sequence of colors. This feature is described in the application, for example, in the section "Simple Thinning for Color," which begind at application page 15, line 14. More specifically, a portion of simple thinning for color is described as:

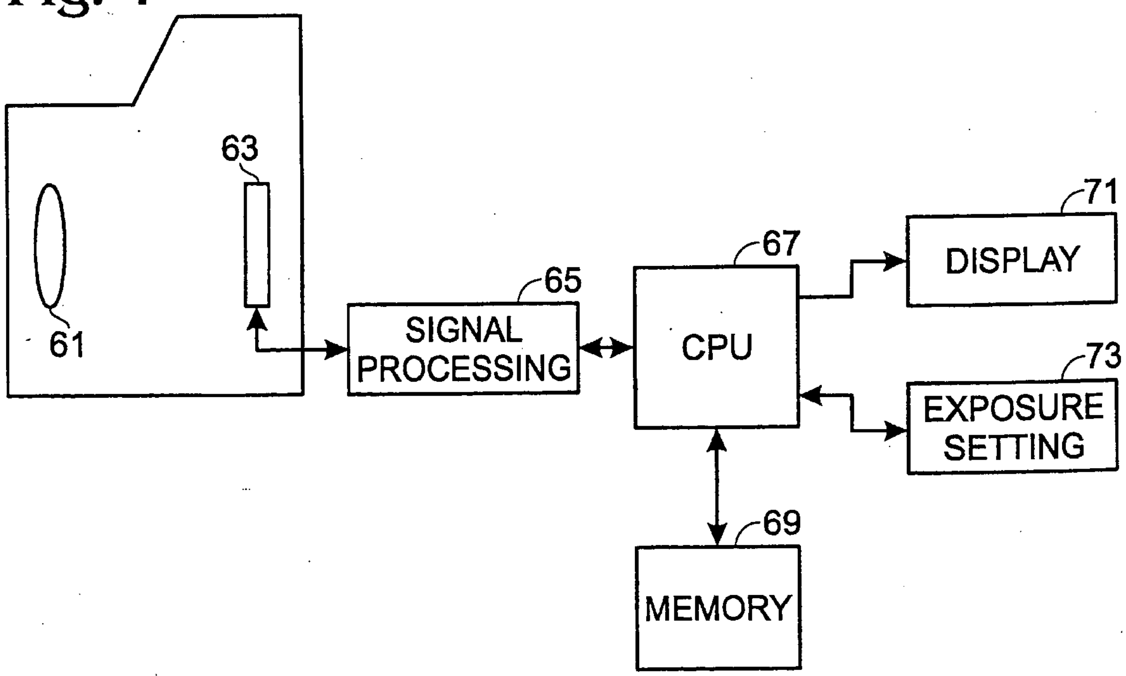
> In the case of a pixel matrix that has the color array of Figure 4, pixels arein the sequence G, R, G, B, G, R, G, B (G = green, R = red, and B = blue). Therefore, to read in the same color sequence when one out of every two pixels

is thinned, a particular sequence must be followed. In this embodiment of simple color thinning, the columns are grouped in four-column blocks and the rows are grouped in four-row blocks. At row 1, the first and second columns of the first four-column block (matrix columns 1 and 2) are read, then the first and fourth columns in the second four-column block (matrix columns 5 and 8) are read, then the first and second columns in the third four-column block (matrix columns 9 and 10) are read, and so on. Thus, in odd-number four-column blocks the first and second columns are read, and in even-number blocks the first and fourth columns are read. (Application page 15, line 25 to page 16, line 6.)

f. Concise Explanation of the Subject Matter of Independent Claim 13

Claim 13 recites an electronic camera (Fig. 7, reproduced below) having a camera lens (61) that receives image light from a photographic object, a display (71), and a solid-state camera device (63).

Fig. 7



Solid-state camera device (63) has a plurality of photoelectric conversion pixels arranged in a matrix of rows and columns (Fig. 1) so that light received by the camera lens (61) is incident on the matrix. A scanning circuit (3,5,7,9, Fig. 1) can read full image information from the photoelectric pixels by sequentially selecting all photoelectric

pixels, and can read a reduced set of image information from the photoelectric pixels by selecting spaced-apart rows of the matrix with omitted rows between them and spaced-apart columns of the matrix with omitted columns between them. (See, e.g., "simple ½ thinning," application page 10, line 22 to page 11, line 22.) A controller (67) can control the camera device to obtain and record full image information of the entire plurality of photoelectric pixels and can control the solid-state camera device to display the reduced set of image information.

> In this electronic camera, an image is thinned and read by solid-state camera device 63 before photographing and when displayed on display device 71 by signal processing circuit 65 and CPU 67. When the number of pixels of the display device 71 is less than the number of pixels of the solid-state camera device 63, an image from the camera device 63 can be made to conform to the display device by thinning and reading so that the image can be displayed at low power consumption and higher speed as compared to reading the entire pixel matrix of the camera device.
>
> In addition, when setting photographic conditions by exposure control circuit 73, image signals obtained by thinning and reading can be processed by signal processing circuit 65 and CPU 67 and exposure settings can be set at high speed. After displaying and setting exposure conditions in this way, solid-state camera device 63 reads all pixels of the entire pixel matrix to obtain a high resolution image signal that is stored in memory 69. As a result, the photographic image that is recorded is a high resolution image. (Application page 29, lines 4-22.)

d. Concise Explanation of the Subject Matter of Independent Claim 14

Claim 14 recites an electronic camera (Fig. 7, reproduced aboove) having a camera lens (61) that receives image light from a photographic object, a solid-state camera device (63) having a plurality of photoelectric conversion pixels arranged in a matrix of rows and columns so that light received by the camera lens is incident on the matrix (Fig. 1). A scanning circuit (3,5,7,9, Fig. 1) reads image information from the photoelectric pixels by a first sequence of selecting each photoelectric pixels and by a second sequence of selecting spaced-apart rows of the matrix with omitted rows between them and spaced-apart columns of the matrix with omitted columns between them, thereby reducing the number of photoelectric pixels that are read. (See, e.g., "simple ½ thinning," application page 10, line 22 to page 11, line 22.)

An exposure control (73) receives image information and sets exposure conditions of the solid-state camera device. A controller (67) controls the solid-state camera device such that the scanning circuit selects photoelectric pixels by the first sequence when the image information is recorded and selects photoelectric pixels by the second sequence when providing image information to the exposure control.

<u>7. Grounds of Rejection to be Reviewed on Appeal</u>

a. Claims 1, 2, 5, 6, and 8-10 stand rejected under 35 USC § 103(a) for obviousness over Homma (US Pat. No. 4,858,020) in view of Hayashi (US Pat. No. 5,734,427) in view of Tanaka (US Pat. No. 6,130,420).

b. Claims 4, 11, and 12 stand rejected under 35 USC § 103(a) for obviousness over Homma (US Pat. No. 4,858,020) in view of Hayashi (US Pat. No. 5,734,427) in view of Tanaka (US Pat. No. 6,130,420) in view of Bowolek et al. (US Pat. No. 5,914,749).

c. Claims 13 and 14 stand rejected under 35 USC § 103(a) for obviousness over Sakurai et al. (US Pat. No. 5,512,945) in view of Homma (US Pat. No. 4,858,020) in view of Hayashi (US Pat. No. 5,734,427) in view of Tanaka (US Pat. No. 6,130,420).

d. Claim 7 stand rejected under 35 USC § 103(a) for obviousness over Homma (US Pat. No. 4,858,020) in view of Hayashi (US Pat. No. 5,734,427) in view of Tanaka (US Pat. No. 6,130,420) in view of Suda (US Pat. No. 6,067,115).

<u>8. Argument</u>

a. . Claims 1, 2, 5, 6, and 8-10 stand rejected under 35 USC § 103(a) for obviousness over Homma (US Pat. No. 4,858,020) in view of Hayashi (US Pat. No. 5,734,427) in view of Tanaka (US Pat. No. 6,130,420).

i. Independent Claim 1 is Patentably Distinct from the cited references

Independent claim 1 recites a solid-state camera device with a vertical group scanning circuit and a vertical selector circuit included in the vertical scanning circuit.

The vertical group scanning circuit selects successive row groups that each includes a plurality of rows. The vertical selector circuit selects at least one desired row within each successive row group selected by the vertical group scanning circuit to provide a row pixel set. The successive row groups extend substantially completely across the pixel matrix in a vertical direction.

The solid-state camera device also includes a horizontal group scanning circuit and a horizontal selector circuit included in the horizontal scanning circuit. The horizontal group scanning circuit selects successive column groups that each includes a plurality of columns. The horizontal selector circuit selects at least one desired column within each successive column group selected by the horizontal group scanning circuit to provide a column pixel set. The successive column groups extend substantially completely across the pixel matrix in a horizontal direction.

The vertical and horizontal group scanning circuits select row and column groups that extend substantially completely across the pixel matrix in vertical and horizontal directions, respectively. Thus, when the number of pixels of the solid-state camera device is different from the number of pixels of a display device coupled to the electronic camera, the vertical and horizontal group scanning circuits allow a thinned image signal to be obtained directly from the camera device for use by the display device. For example, the thinned image signal could include every second or third row and every second or third column of pixels. The thinned image signal has a reduced number of pixels, according to the number of pixels of the display device, but encompass the full extent of the image.

In contrast, prior art devices read ALL pixels from the solid-state camera device into an image memory. A thinned image signal is then read from the image memory, not directly from the solid-state camera device. Always reading all pixels from the solid-state camera device into an image memory is slow and wastes system power.

The Examiner cites Homma as teaching at column 5, lines 12-20 the use of a selector circuit or clock control circuitry that reads image signals according to a selection signal by selecting a desired one row or one column from within the row group or column group selected by the group scanning circuit. Homma teaches that the vertical shift register selects lines in a line sequential manner and, therefore, selects one line at a time

within the group of lines selected to be read out. (Homma col. 5, lines 17-20.) As noted by the Examiner:

> Homma teaches the use of an image sensor that can read image data from an area smaller than the entire area of an image sensor using horizontal (21) and vertical registers (22). Homma teaches the use of reading out a continuous region (12) in the center of the image sensor (11) but does not teach a thinning method where the image sensor can read out row groups and column groups from the image sensor. (Final Office Action dated Feb. 2, 2004, page 2.)

The reading of just a central portion of an image is illustrated in Fig.2 of Homma, which is reproduced below:

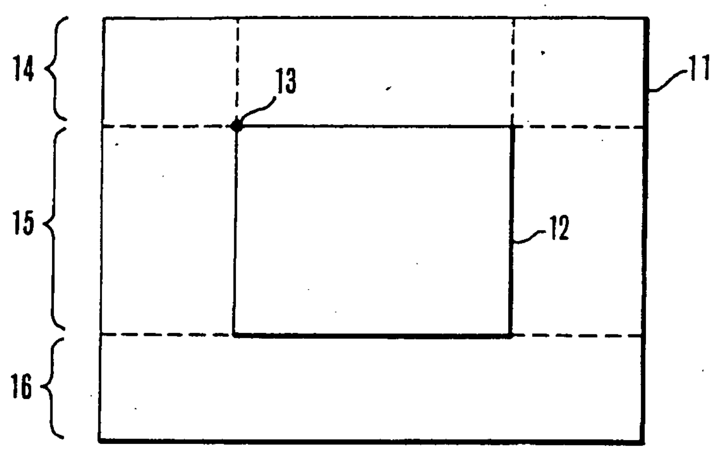


FIG.2

In this illustration, central region 12 is the contiguous image portion that is read from the image sensor 11.

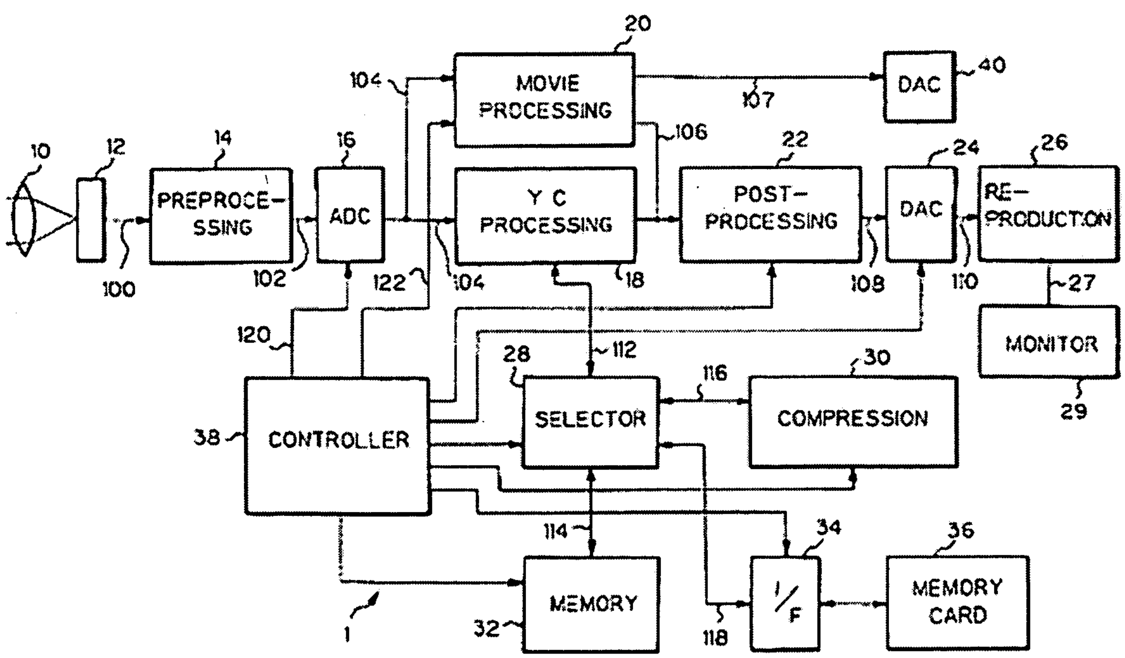
The Examiner cites Hayashi as disclosing a "thinning feature:"

> Hayashi teaches in the abstract an on Column 2, Lines 40-67 and Column 3, lines 1-15 that it is advantageous to enable a camera to have a thinning feature in which it can thin an image in both a horizontal and vertical direction over the entire region of the image. Hayashi teaches that a thinning process can be performed by using image processing. This method is advantageous because it allows the image displayed on the entire region of the image sensor to be displayed on a display with a lower resolution.
>
> Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to enable the invention of Homma with the thinning process of Hayashi in order to allow the image displayed on the entire region of the image sensor to be displayed on a display with a lower resolution. (Final Office Action dated Feb. 2, 2004, page 2.)

And the Examiner cites Tanaka as teaching that thinning is advantageous because it reduces power dissipation.

Applicants submit that neither Homma, nor any of the other cited references, teaches or suggests a solid-state camera device with vertical and horizontal scanning circuits that provide scanning of row and column groups that extend substantially completely across a pixel matrix in respective vertical and horizontal directions. Homma describes a system that provides a digital equivalent to optical tele-conversion by reading sensed image information from only the middle part of a solid-state image sensor. (Homma, col. 1, lines 44-50 and Figs. 1, 2, and 5.) The system of Homma is directed to providing electronic zooming and panning of images (Homma col. 1, line 63 to col. 2, line 2 and col. 4, lines 9-12.)

Fig. 1 of Hayashi (reproduced below) shows an electronic still camera 1 that includes a movie processing component 20 for converting the high-resolution electric signal from the still camera 1 to a low-resolution signal by thinning it. This allows the image to appear on a remote monitor 29.



In operation, the thinning process of Hayashi stores the still camera high-resolution image in a frame buffer in ADC 16 and thins the image for the remote monitor 29 while the image is retrieved the from a frame buffer memory:

> The controller 38 has a first control circuit, not shown, for controlling the various sections of the camera 1 stated above, and a second control circuit, not shown, exclusively assigned to the movie processing 20. In an application in which the image of a subject is output from the high-resolution CCD image sensor 12 and monitored by the NTSC monitor 29, the second control circuit is adapted to generate a control signal for causing high-resolution image data to be read out of the frame memory of the ADC 16 while being thinned in matching relation to the number of dots of the monitor 29 in the horizontal and vertical directions. Further, the second control circuit feeds various control signals to the movie processing 20 which processes the image data read out of the frame memory. (Hiyashi col. 4, lines 9-22, emphasis added.)

Applicants note, therefore, that the solid-state imaging device 12 of Hiyashi always provides a high resolution image to the frame buffer in ADC 16. The solid-state imaging device 12 of Hiyashi provides no thinning.

The Examiner cites Tanaka as teaching that thinning is advantageous because it reduces power dissipation. Applicants note, however, that Tanaka has a US filing date of April 28, 1998 and claims priority from an earlier-filed Japanese application. The present application has a foreign priority of April 16, 1998 based upon Japanese application No. 10-225281.

Tanaka claims priority from a Japanese application, not from an international (PCT) application that designated the United States and was published under PCT Article 21(2). The effective date of Tanaka as prior art under 35 USC 102(e) is therefore the actual US filing date, April 28, 1998, which is after the April 16, 1998 priority date of the present application. Applicants submit, therefore, that Tanaka is not prior art against the present application.

Applicants submit that the remaining references, Homma and Hayashi, do not teach or suggest the subject matter of claim 1. Homma is directed to displaying a segment that is smaller than the pixel matrix, and so would lead a person skilled in the art away from the subject matter of claim 1. As noted by the Examiner, Homma provides no teaching or suggestion of providing a substantially complete image with a reduced set of

pixels that extends substantially completely across a pixel matrix, as provided by the scanning of row and column groups recited in claim 1.

Hayashi always reads all of the image data from solid-state imaging device 12 to the frame buffer in ADC 16. As noted in the application at page 2, lines 9-12, "this prior art operation, of reading all pixels, storing the image data from all pixels in image memory, and scanning only the required portion of image memory for display has the problems of taking a long time to execute and consuming much power." Accordingly, Hayashi provides no teaching or suggestion providing a substantially complete image with a reduced set of pixels read from the photoelectric pixels of a solid-state camera device. Applicants submit, therefore, that the rejection of claim is improper and should be REVERSED.

ii. Independent Claim 10 is Patentably Distinct from the cited references

Amended claim 10 recites a solid-state camera device with means for reading a reduced pixel set comprising plural spaced-apart horizontal rows of pixels and plural spaced-apart vertical columns of pixels. The horizontal rows are arranged substantially completely across a pixel matrix in a vertical direction and the vertical columns are arranged substantially completely across the matrix in a horizontal direction.

Homma describes a system in which a central, contiguous pixel set may be read from a pixel matrix. This reading of just a central, contiguous portion of an image is illustrated by Fig.2 of Homma, which is reproduced below:

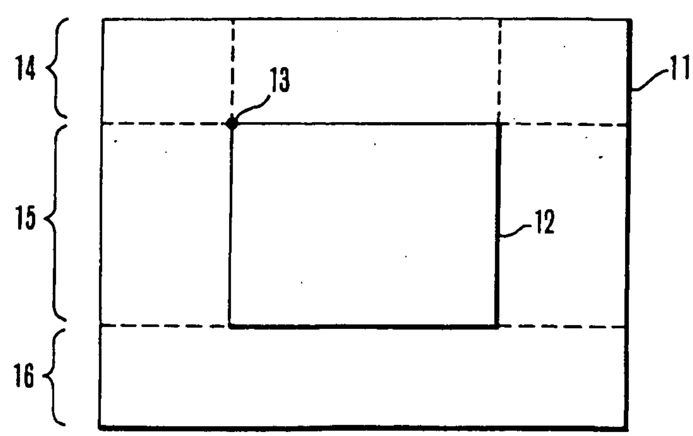


FIG.2

Homma does not teach or suggest reading spaced-apart rows or columns of pixels. In addition, Homma does not teach or suggest reading a reduced pixel set that extends substantially completely across the pixel matrix.

Hayashi is directed to an electronic still camera 1 that includes a movie processing component 20 for converting the high-resolution electric signal from the still camera 1 to a low-resolution signal by thinning it. This allows the image to appear on a remote monitor 29. In operation, the thinning process of Hayashi stores the still camera high-resolution image in a frame buffer in ADC 16 and thins the image for the remote monitor 29 while the image is retrieved the from a frame buffer memory. Tanaka is not prior art to the present application under 35 USC 102(e).

Applicants submit that Homma and Hayashi do not teach or suggest "means for reading a reduced pixel set" from the photoelectric pixels of a solid-state camera device, the reduced pixel set having plural spaced-apart horizontal rows of pixels and plural spaced-apart vertical columns of pixels that are arranged substantially completely across a pixel matrix. Neither reference reads such a reduced pixel set from the photoelectric pixels of a solid-state camera device. Hayashi always reads all the pixels, and Homma reads only pixels that are not spaced apart and that do not extend substantially completely across a pixel matrix. Applicants submit, therefore that claim 10 is patentably distinct from the cited references and that the rejection of claim 10 should be REVERSED.

iii. Dependent Claims 2, 5, and 6 are Patentably Distinct from the cited references

Dependent claim 2 recites that the horizontal selector circuit and the vertical selector circuit include respective memories for storing respective column and row pixel sets. As set forth in claim 1, the column and row pixel sets correspond to column and row groups that extend substantially completely across the pixel matrix. Neither Homma nor any of the other cited references teaches or suggests a solid-state camera device that generates such data. As a result, neither Homma nor any of the other cited references can teach or suggest memories that store such data. Applicants submit, therefore, that the rejection of claim 2 should be REVERSED.

With regard to claim 5, the Examiner states that the recited cut-off switch is inherent in the design of Homma. Applicants note that for a feature to be inherent, the cited reference must "necessarily" disclose feature, even though it says nothing explicit concerning it. MPEP 2163.07(a). Applicants note that the recited cut-off switch is described in the application at page 8, lines 5-12, as reducing power used by non-selected pixels. There is no indication that cutting-off power to such pixels is necessary to not selecting them. Applicants submit, therefore, that the rejection of claim 5 is improperly based upon a feature that is not necessarily or inherently included in the cited reference. Applicants submit, therefore, that the rejection of claim 5 should be REVERSED.

With regard to claim 6, the Examiner states that Homma discloses the recited shift registers. Amended claim 6 recites shift registers that can be preset globally so as to select simultaneously a plurality of spaced-apart row groups or and a plurality of spaced-apart column groups, respectively. Applicants submit that Homma provides no teaching or suggestion of reading plural spaced-apart row and columns and, as a result, provides no teaching or suggestion of shift registers that select plural spaced-apart row groups and plural spaced-apart column groups. Applicants submit, therefore, that the rejection of claim 6 should be REVERSED.

b. . Claims 4, 11, and 12 stand rejected under 35 USC § 103(a) for obviousness over Homma (US Pat. No. 4,858,020) in view of Hayashi (US Pat. No. 5,734,427) in view of Tanaka (US Pat. No. 6,130,420) in view of Bowolek et al. (US Pat. No. 5,914,749).

i. Independent Claim 11 is Patentably Distinct from the cited references

Claim 11 recites a reading scanning circuit that reads pixels by selecting a reduced pixel set of the photoelectric pixels in a color pixel matrix. The reduced pixel set includes at least omitted rows of pixels or omitted columns of pixels and has a color sequence that is substantially similar to the first sequence of colors.

Bawolek et al. is cited as describing a color pixel configuration for an image-sensing device. Applicants note that Bowolek describes a magenta-white-yellow color system for a digital image sensor, as illustrated in Bowolek Fig. 3b (reproduced below).

M	W	M	W	M	W	M	W	M	W
W	Y	W	Y	W	Y	W	Y	W	Y
M	W	M	W	M	W	M	W	M	W
W	Y	W	Y	W	Y	W	Y	W	Y
M	W	M	W	M	W	M	W	M	W
W	Y	W	Y	W	Y	W	Y	W	Y
M	W	M	W	M	W	M	W	M	W
W	Y	W	Y	W	Y	W	Y	W	Y

Fig. 3b

The purposes and benefits of the MWY color system of Bowolek are described as follows:

> The invention relates to a color imaging device comprised of an array of light selective elements. The light selective elements include a first light selective element selective to light having a wavelength corresponding to the Magenta region of the spectrum. The second light selective element is selective to light having a wavelength corresponding to the White region of the spectrum. A third light selective element is selective to light having a wavelength corresponding to the Yellow region of the spectrum. The invention also relates to a color-imaging sensor having an array of Magenta-White-Yellow (MWY) light selective elements such as described. Still further, the invention relates to an imaging sensor and an imaging system each utilizing a MWY color system.
>
> The MWY system disclosed in the invention provides excellent color fidelity. The use of a White pixel means that no visible light incident on the White pixel is ignored by the sensor. The Magenta and Yellow color channels are complimentary and therefore pass at least two-thirds of the available light when compared to non-complimentary systems like RGB. Compared to an RGB color system, the MWY system therefore provides an improved signal-to-noise ratio, reflected in a more accurate prediction of the human eye color response. (Bowolek col. 3, line 65 to col. 4, line 21.)

Claim 11 recites selecting a reduced pixel set of the photoelectric pixels in a color pixel matrix, the reduced pixel set including at least omitted rows of pixels or omitted columns of pixels and has a color sequence that is substantially similar to the first sequence of colors. By <u>including</u> omitted rows or columns of pixels, the reduced pixel set that includes spaces for omitted pixels.

Homma describes a system that reads only contiguous pixel sets, with no omitted pixels included in the set. Bowolek et al. describes a color pixel set. Neither reference teaches or suggests reading a reduced color pixel set that <u>includes</u> omitted pixels and has substantially the same color sequence as in the pixel matrix. Applicants submit, therefore that claim 11 is patentably distinct from the cited reference and that the rejection should be REVERSED.

ii. Dedependent Claim 4 is Patentably Distinct from the cited references

Claim 4 depends from claim 1 and recites that photoelectric pixels of the pixel matrix are arranged in a first sequence of color, and that the vertical scanning circuit and horizontal scanning circuit read a non-contiguous reduced image set from the pixels in a sequence of color that is substantially identical to the first sequence of color.

Bowlek describes a magenta-white-yellow color system for a digital image sensor. The combination cited by the Examiner would select a contiguous central group of pixels (Homma) from a set of multi-color pixels (Bowalek). However, neither Bowlek nor Homma provides any teaching or suggestion of selecting from a sequence of color pixels column and row groups that extend substantially completely across the pixel matrix (claim 1). Moreover, neither Bowlek nor Homma provides any teaching or suggestion of reading a non-contiguous reduced image set from the pixels and form a reduced image set with substantially the same color sequence. Applicants submit that claim 4 is patentably distinct from the cited references and that the rejection be REVERSED.

c. Claims 13 and 14 stand rejected under 35 USC § 103(a) for obviousness over Sakurai et al. (US Pat. No. 5,512,945) in view of Homma (US Pat. No. 4,858,020) in view of Hayashi (US Pat. No. 5,734,427) in view of Tanaka (US Pat. No. 6,130,420).

i. Independent Claim 13 is Patentably Distinct from the cited references

Claim 13 recites an electronic camera that includes a solid-state camera device having a scanning circuit that can read full image information from the photoelectric pixels by sequentially selecting all photoelectric pixels, and can read a reduced set of image information from the photoelectric pixels by selecting spaced-apart rows of the

matrix with omitted rows between them and spaced-apart columns of the matrix with omitted columns between them.

The Examiner cites Sakurai as teaching a digital camera, but notes that Sakurai does not teach the recited scanning circuit. The Examiner cites Homma, Hayashi and Tanaka as teaching the scanning circuit. As noted above in the discussion of claim 1, Tanaka is not prior art to the present application.

Homma describes a system in which a central, contiguous pixel set may be read from a pixel matrix. This reading of just a central, contiguous portion of an image is illustrated by Fig.2 of Homma, which is reproduced below:

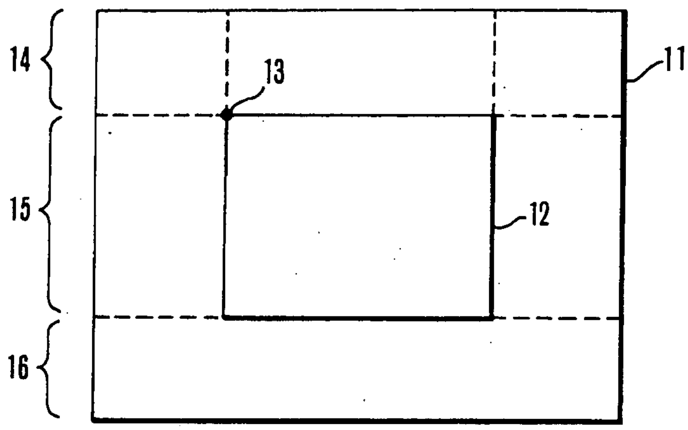


FIG.2

Homma does not teach or suggest reading spaced-apart rows or columns of pixels.

Hayashi is directed to an electronic still camera 1 that includes a movie processing component 20 for converting the high-resolution electric signal from the still camera 1 to a low-resolution signal by thinning it. This allows the image to appear on a remote monitor 29. In operation, the thinning process of Hayashi stores the still camera high-resolution image in a frame buffer in ADC 16 and thins the image for the remote monitor 29 while the image is retrieved the from a frame buffer memory. Tanaka is not prior art to the present application under 35 USC 102(e), as explained above in the discussion of claim 1.

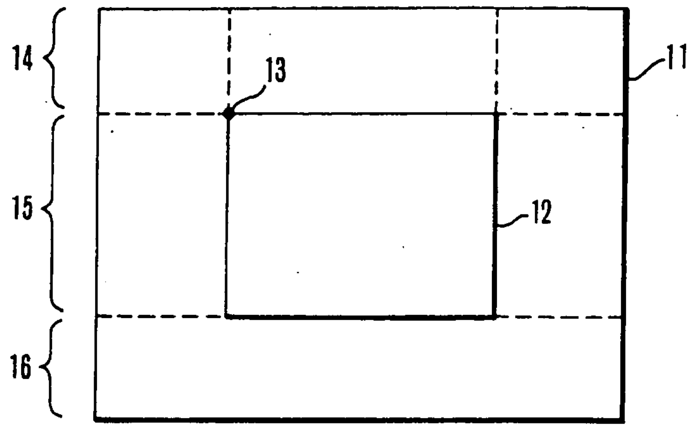
Applicants submit that Homma and Hayashi do not teach or suggest a solid-state camera device having a scanning circuit that can read "a reduced set of image information from the photoelectric pixels by selecting spaced-apart rows of the matrix with omitted rows between them and spaced-apart columns of the matrix with omitted columns between them." Neither reference reads such a reduced pixel set from the photoelectric pixels of a solid-state camera device. Hayashi always reads all the pixels, and Homma reads only pixels that are not spaced apart. Applicants submit, therefore that claim 13 is patentably distinct from the cited references and that the rejection of claim 13 should be REVERSED.

ii. Independent Claim 14 is Patentably Distinct from the cited references

Claim 14 recites an electronic camera that includes a solid-state camera device having a scanning circuit that reads image information from photoelectric pixels by a first sequence of selecting each photoelectric pixels and by a second sequence of selecting spaced-apart rows of the matrix with omitted rows between them and spaced-apart columns of the matrix with omitted columns between them, thereby reducing the number of photoelectric pixels that are read.

The Examiner cites Sakurai as teaching a digital camera, but notes that Sakurai does not teach the recited scanning circuit. The Examiner cites Homma, Hayashi and Tanaka as teaching the scanning circuit. As noted above in the discussion of claim 1, Tanaka is not prior art to the present application.

Homma describes a system in which a central, contiguous pixel set may be read from a pixel matrix. This reading of just a central, contiguous portion of an image is illustrated by Fig.2 of Homma, which is reproduced below:



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Homma does not teach or suggest reading spaced-apart rows or columns of pixels.

Hayashi is directed to an electronic still camera 1 that includes a movie processing component 20 for converting the high-resolution electric signal from the still camera 1 to a low-resolution signal by thinning it. This allows the image to appear on a remote monitor 29. In operation, the thinning process of Hayashi stores the still camera high-resolution image in a frame buffer in ADC 16 and thins the image for the remote monitor 29 while the image is retrieved the from a frame buffer memory. Tanaka is not prior art to the present application under 35 USC 102(e), as explained above in the discussion of claim 1.

Applicants submit that Homma and Hayashi do not teach or suggest a solid-state camera device having a scanning circuit that can read image information from photoelectric pixels by "a second sequence of selecting spaced-apart rows of the matrix with omitted rows between them and spaced-apart columns of the matrix with omitted columns between them, thereby reducing the number of photoelectric pixels that are read." Neither reference reads such a reduced pixel set from the photoelectric pixels of a solid-state camera device. Hayashi always reads all the pixels, and Homma reads only pixels that are not spaced apart. Applicants submit, therefore that claim 14 is patentably distinct from the cited references and that the rejection of claim 14 should be REVERSED.

d. Claim 7 stands rejected under 35 USC § 103(a) for obviousness over Homma (US Pat. No. 4,858,020) in view of Hayashi (US Pat. No. 5,734,427) in view of Tanaka (US Pat. No. 6,130,420) in view of Suda (US Pat. No. 6,067,115).

Claim 7 depends from claim 1. Claim 7 stands or falls with independent claim 1.

9. Summary

In view of the foregoing, appellant submits that the Examiner's rejections of claims 1, 2, and 4-14 are improper, and reversal of all of the rejections is respectfully requested.

Respectfully submitted,

ipsolon llp

By: ______________________

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10. Appendix A: The Claims Involved in the Appeal

1. A solid-state camera device having a pixel matrix with a plurality of photoelectric pixels arranged in a plurality of rows and columns, and a vertical scanning circuit that selects a row of the plurality of rows of photoelectric pixels, and a horizontal scanning circuit that selects a column of the plurality of columns of photoelectric pixels, and wherein an image signal is read by selecting at least one photoelectric pixel by the vertical scanning circuit and horizontal scanning circuit and transferring a charge from the at least one selected photoelectric pixel, the improvement comprising:

a vertical group scanning circuit and a vertical selector circuit included in the vertical scanning circuit, the vertical group scanning circuit selecting successive row groups that each includes a plurality of rows, the vertical selector circuit selecting at least one desired row within each successive row group selected by the vertical group scanning circuit to provide a row pixel set, the successive row groups extending substantially completely across the pixel matrix in a vertical direction; and

a horizontal group scanning circuit and a horizontal selector circuit included in the horizontal scanning circuit, the horizontal group scanning circuit selecting successive column groups that each includes a plurality of columns, the horizontal selector circuit selecting at least one desired column within each successive column group selected by the horizontal group scanning circuit to provide a column pixel set, the successive column groups extending substantially completely across the pixel matrix in a horizontal direction.

2. The solid-state camera device of claim 1 wherein the horizontal selector circuit includes memory that stores each column pixel set and the vertical selector circuit includes memory that stores each row pixel set, and wherein the horizontal scanning circuit reads the stored column pixel sets sequentially by horizontal reading intervals and the vertical scanning circuit reads the stored row pixel sets sequentially by vertical reading intervals.

4. The solid-state camera device of claim 1 wherein the photoelectric pixels of the pixel matrix are arranged in a first sequence of color, and the vertical scanning circuit

and horizontal scanning circuit read a non-contiguous reduced image set from the pixels in a sequence of color that is substantially identical to the first sequence of color.

5. The solid-state camera device of claim 1 wherein the horizontal selector circuit has a power cutoff function that interrupts power to the columns not selected by the horizontal selector circuit and the vertical selector circuit has a power cutoff function that interrupts power to the rows not selected by the vertical selector circuit.

6. The solid-state camera device of claim 1 wherein the vertical group scanning circuit and the horizontal group scanning circuit are each comprised of shift registers that can be preset globally so as to select simultaneously a plurality of spaced-apart row groups or and a plurality of spaced-apart column groups, respectively.

7. A method of determining a maximum luminance of a plurality of pixels in a first column of photoelectric pixels of the solid-state camera of claim 6, comprising the steps of simultaneously reading a plurality of rows.

8. A method of summing image signals from a plurality of photoelectric pixels of a first row of photoelectric pixels of the solid-state camera of claim 1, comprising the steps of reading a plurality of columns simultaneously.

9. The solid-state camera device of claim 1 wherein the photoelectric pixels that are read can be reset.

10. A solid-state camera device having a plurality of photoelectric pixels arranged in a matrix along rows and columns and a reading scanning circuit that selects and reads photoelectric pixels, the improvement comprising:

means for reading a reduced pixel set comprising plural spaced-apart horizontal rows of pixels and plural spaced-apart vertical columns of pixels, the horizontal rows being arranged substantially completely across the matrix in a vertical direction and the vertical columns being arranged substantially completely across the matrix in a horizontal direction.

11. A solid-state camera device having a color pixel matrix including a plurality of photoelectric pixels of different colors arranged in a first sequence of colors along rows and columns, the improvement comprising,

a reading scanning circuit that reads pixels by selecting a reduced pixel set of the photoelectric pixels in the color pixel matrix, the reduced pixel set including at least

omitted rows of pixels or omitted columns of pixels and having a color sequence that is substantially similar to the first sequence of colors.

12. The solid-state camera element of claim 11, wherein the reduced pixel set includes omitted rows of pixels and omitted columns of pixels.

13. An electronic camera, comprising:

a camera lens that receives image light from a photographic object;

a display;

a solid-state camera device having a plurality of photoelectric conversion pixels arranged in a matrix of rows and columns so that light received by the camera lens is incident on the matrix, and a scanning circuit that can read full image information from the photoelectric pixels by sequentially selecting all photoelectric pixels, and can read a reduced set of image information from the photoelectric pixels by selecting spaced-apart rows of the matrix with omitted rows between them and spaced-apart columns of the matrix with omitted columns between them; and

a controller can control the camera device to obtain and record full image information of the entire plurality of photoelectric pixels and can control the solid-state camera device to display the reduced set of image information.

14. An electronic camera, comprising:

a camera lens that receives image light from a photographic object;

a solid-state camera device having a plurality of photoelectric conversion pixels arranged in a matrix of rows and columns so that light received by the camera lens is incident on the matrix, and a scanning circuit that reads image information from the photoelectric pixels by a first sequence of selecting each photoelectric pixels and by a second sequence of selecting spaced-apart rows of the matrix with omitted rows between them and spaced-apart columns of the matrix with omitted columns between them, thereby reducing the number of photoelectric pixels that are read;

an exposure control receives image information and sets exposure conditions of the solid-state camera device; and

a controller that controls the solid-state camera device such that the scanning circuit selects photoelectric pixels by the first sequence when the image information is

recorded and selects photoelectric pixels by the second sequence when providing image information to the exposure control.

PATENT
Atty Docket No. 1113-011/MMM

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: Yomeyama
Application Number: 09/293,490
Filing Date: April 15, 1999
Title: Electronic Camera and Solid-State Camera Element that Provides a Reduced Pixel Set
Date of Response: December 18, 2004

Examiner: Hannett, James M.
Art Unit: 2612

Certificate of Transmission Under 37 C.F.R. § 1.8

I hereby certify that this paper and the documents referred to as being attached or enclosed herewith are being transmitted to Commissioner for Patents, PO Box 1450, Alexandria, VA 22313-1450 on December 18, 2004

Mark M. Meininger (Registration No. 32,428)
Attorney of Record

TRANSMITTAL LETTER

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Enclosed for filing in the above-identified application is/are:

- Appeal Brief (37 CFR 41.37) based upon Notice of Appeal filed July 26, 2004 ($500)
- A two month extension is requested ($450)
- A check for $950

Please charge any additional fees that may be required in connection with filing this amendment and any extension of time, or credit any overpayment, to Deposit Account No. 500241. A copy of this sheet is enclosed.

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Respectfully Submitted,

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